

Appl. No. 10/734,116

Amdt. dated December 20, 2007

Reply to Office Action of September 20, 2007

**Remarks/Arguments:**

The disclosure has been amended on pages 2 and 5 to fully identify the patent application of S. Dedieu and P. Moquin entitled "*Method for Broadband Constant Directivity Beamforming for Non Linear and Non Axi-Symmetric Arrays Embedded in an Obstacle*", by its US Patent Application Publication No. 2004/0120532.

Page 5 has been further amended to insert a period at the end of the paragraph at lines 8 – 10.

Claim 2 has been amended to correct the error in claim dependency noted by the Examiner.

Claims 1-8, 10 and 12 stand rejected under 35 USC 102 (e) as being anticipated by Stinson et al. (US 7,068,801).

Stinson et al set forth a super-directive microphone array embedded in an obstacle of complex shape in connection with which a Boundary Element method is utilized to compute the pressure field diffracted by the obstacle. Stinson et al is relevant for teaching the use of an obstacle to provide enhanced directivity in the low frequency domain. However, the disclosed method and apparatus are applicable only for narrow band telephony. Specifically, Stinson et al fail to teach or suggest any

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application of linear constraints to the beamformer, as discussed in greater detail below.

Independent claims 1 and 12 have been amended to further distinguish over the cited Stinson et al reference. Specifically, claims 1 and 12 have been amended to specify that the beamformer is linearly constrained "using two symmetrical look directions  $d_{\theta-\alpha}$  and  $d_{\theta+\alpha}$  with a gain constraint less than one and wherein the spacing  $\theta-\alpha$  and  $\theta+\alpha$  is controlled by  $\alpha$  which increases with frequency". Claim 5 has been cancelled. Claim 10 has been re-written in independent form including the limitations of cancelled claim 5.

Examiner cites column 4, lines 38 – 41 for allegedly disclosing the application of linear constraints to a beamformer in order to provide a smooth transition between low and high frequency directivity responses. With respect, column 4, lines 38 – 41 of Stinson et al merely discloses uniform amplitude weighting of gain values applied to respective microphones in an array, in combination with respective time delays ( $\tau$ ) chosen so that all microphone signals are in phase relative to a particular look direction. As indicated by Stinson et al at column 4, lines 41 – 43: "This approach is equivalent to delay-and-sum beamforming for an array in free space". There is no suggestion, whatsoever, of applying linear constraints to the beamformer.

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Having regard to claim 10, Examiner cites column 8, lines 20-45 for teaching the application of linear constraints to a beamformer using two symmetrical look directions  $d_{\theta-\alpha}$  and  $d_{\theta+\alpha}$  with a gain constraint less than one where the spacing  $\theta-\alpha$  and  $\theta+\alpha$  is controlled by  $\alpha$  which increases with frequency. With respect, column 8, lines 20-45 of Stinson et al merely clarifies the teachings of column 4, lines 38 – 41, discussed above, that time delays ( $\tau$ ) be chosen so that all microphone signals are in phase relative to a particular look direction. Specifically, Stinson et al teaches bringing all microphone signal contributions in phase for a particular look direction by setting the beamformer weights to  $\omega\tau_m = -kr_{ml}$ . There is no suggestion, whatsoever, of applying linear constraints to the beamformer “using two symmetrical look directions  $d_{\theta-\alpha}$  and  $d_{\theta+\alpha}$  with a gain constraint less than one and wherein the spacing  $\theta-\alpha$  and  $\theta+\alpha$  is controlled by  $\alpha$  which increases with frequency” for the purpose of “providing a smooth transition between said low and high frequency directivity responses”, as claimed.

Retraction of Examiner's rejection of claims 1-8, 10 and 12 under 35 USC 102 (e), is respectfully requested.

Claim 9 is rejected under 35 USC 103 (a) as being unpatentable over Stinson et al. in view of Turnbull et al. (US patent 6,681,023).

Claim 11 is rejected under 35 USC 103 (a) as being unpatentable over Stinson et al.

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Claims 9 and 11 are dependent on amended independent claim 10 and are, therefore, believed to be patentable for the reasons discussed above.

Retraction of Examiner's rejection claims 9 and 11 under 35 USC 103 (a) is respectfully requested.

Applicant believes that this application is now in condition for allowance. To the extent that any issues remain to be resolved, however, Applicant requests that the Examiner contact the undersigned to resolve these issues.

The Commissioner is also authorized to charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 502721.

Respectfully submitted,



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December 20, 2007  
(date)